

NK1825

1 What is Claimed is:

1 1. A three-dimensional structure element comprising:
2 a substrate; and
3 three-dimensional structures arranged in a
4 predetermined effective area on the substrate, wherein
5 the three-dimensional structures have space portions,
6 which are formed by removing a sacrificial layer, between
7 the three-dimensional structures and the substrate, and
8 on the substrate, a dummy area is arranged to surround
9 the effective area, dummy structures are arranged in the
10 dummy area, and the dummy structures have space portions,
11 which are formed by removing a sacrificial layer, between
12 the dummy structures and the substrate.

1 2. A three-dimensional structure element according to
2 claim 1, wherein a portion of the dummy structures opposed
3 to the substrate is formed in a same shape as the
4 three-dimensional structures.

1 3. A three-dimensional structure element according to
2 claim 1, wherein the dummy structures have columns for fixing
3 at least one section thereof to the substrate.

1 4. A three-dimensional structure element according to
2 claim 1, wherein the dummy structures have a thin film

NK1825

3 covering the dummy area and plural columns arranged between
4 the thin film and the substrate.

1 5. An optical switch comprising:

2 an optical waveguide substrate; and

3 a three-dimensional element substrate including
4 displaceable reflecting mirrors, wherein

5 the three-dimensional structure element substrate has
6 a substrate and three-dimensional structures arranged in
7 a predetermined effective area on the substrate,

8 the three-dimensional structures include the
9 reflecting mirrors and displacement portions on which the
10 reflecting mirrors are placed, and the displacement portions
11 have space portions, which are formed by removing a
12 sacrificial layer, between the displacement portions and
13 the substrate, and

14 on the substrate, a dummy area is provided to surround
15 the effective area, dummy structures are arranged in the
16 dummy area, and the dummy structures have space portions,
17 which are formed by removing a sacrificial layer, between
18 the dummy structures and the substrate.

1 6. A micro device comprising displaceable thin film
2 three-dimensional structures, wherein

3 the micro device has a substrate and the thin film
4 three-dimensional structures arranged in a predetermined
5 effective area on the substrate,

NK1825

6 the thin film three-dimensional structures have space
7 portions, which are formed by removing a sacrificial layer,
8 between the thin film three-dimensional structures and the
9 substrate, and

10 on the substrate, a dummy area is arranged to surround
11 the effective area, dummy structures made of a thin film
12 are arranged in the dummy area, and the dummy structures
13 have space portions, which are formed by removing a
14 sacrificial layer, between the dummy structures and the
15 substrate.

1 7. A method of manufacturing a three-dimensional
2 structure element comprising:

3 a step of forming a sacrificial layer and predetermined
4 thin film three-dimensional structures in a predetermined
5 effective area on a substrate and forming a sacrificial layer
6 and predetermined thin film dummy structures in a dummy area
7 surrounding the effective area; and

8 a step of removing the sacrificial layers in the
9 effective area and the dummy area with a dry process.

1